
**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Facilitating Opportunities for Flexible,)	ET Docket No. 03-108
Efficient, and Reliable Spectrum Use)	
Employing Cognitive Radio Technologies)	
)	
Authorization and Use of Software Defined)	ET Docket No. 00-47
Radios)	(Terminated)

Via the ECFS

DELL INTRODUCTION

On December 30, 2003, the Federal Communications Commission (FCC) released the above-referenced Notice of Proposed Rulemaking (NPRM) seeking comments regarding cognitive radio technologies and FCC proposed rules related to cognitive radio operation. Dell understands this NPRM to be very important in the advancement of rules to allow a radio to adjust its operations based on real time conditions of its operating environment. These new capabilities will allow for more efficient use of currently available unlicensed spectrum and could help to facilitate release of additional spectrum for unlicensed use contingent on these intuitive radio behaviors. Dell commends the FCC for its efforts to amend the rules in support of cognitive radio technologies.

DELL COMMENTS

In this NPRM the FCC outlines many near term goals of rule changes for cognitive radio behavior that will affect the industry, the consumer and the FCC as a regulating body. Additionally, the NPRM outlines longer term goals and advances that may improve efficiency and flexibility in currently available unlicensed frequencies as well as other possible target frequencies whether fallow or under utilized. Dell urges the FCC to act swiftly on the near term

items while maintaining steady focus on those items that may affect access to spectrum long term.

1. Dell's Comments on the Background Section.

In the Background section of the NPRM, the definition of a software defined radio (SDR) is outlined. Additionally, in the Discussion section cognitive radio capabilities are explored and defined. Dell believes these definitions are sound, but Dell urges that the FCC does not specify a technological regulatory implementation to meet its goals. Dell urges the FCC to be explicit in the protections it seeks and to ensure that it establishes a regulatory framework allowing innovation to meet these demands where appropriate. As an illustration, an example of this approach would be to avoid SDR rules for an existing product to begin using recently allocated spectrum 5.47-5.725 GHz:

EXAMPLE: A UNII device has been previously certified with the 5.15-5.35GHz and 5.725–5.825 GHz bands. Now Dell would like to enable the firmware on the device to include the new 5.470–5.725 band with dynamic frequency selection (DFS) and transmitter power control (TPC) described in the Report & Order in FCC 03-287 (ET Docket No. 03-122). There is no hardware change on the device but only a firmware update. After a successful Class II permissive change Dell would post a web update that would only work on the appropriate device. The customer would have the ability to download and install updated firmware for their device. Dell does not agree that the device should be re-approved as a Software Defined Radio under a separate FCC ID number from the original device. However Dell does agree that test data showing compliance with the new DFS and TPC requirements must be submitted for all applicable bands in the Class II permissive change application.

2. Dell's Comments on Rural Markets and Unlicensed Devices.

The section “Application: Rural Markets and Unlicensed Devices,” sections 33 – 47 in the NPRM, assumes that cognitive radio techniques may be applied to allow for higher powered operations in rural areas (note: the “Rural Market” definition has not yet been defined.). Dell urges the FCC to also consider the possibility for cognitive radio techniques to be applied in order to allow higher powered operations in all locations, not just rural areas.

An intuitive radio operating to minimize interference in the unlicensed frequency bands could feasibly operate at higher power regardless of demographic/geographic designations. Dell fully agrees with the statement in section 36. “*We propose to permit higher power operation by*

unlicensed devices in any area that has limited spectrum use, provided the device has capabilities to determine whether it is in an area with limited spectrum use.” If the FCC seeks to limit availability of this higher power operation, it should be based on the devices lack of ability to interoperate with other radio devices to ensure effective and efficient spectrum utilization and not on demographic definitions.

In addition, section 40 the NPRM asks *“We also seek comment on whether we should exempt devices operating under the control of a master controller from complying with DFS or other requirements”* Advantages awarded by cognitive radio techniques (including DFS) should be extended to the system level, exempting devices operating under a master controller. A lone device that is not “spectrum friendly” endangers efficient spectrum use far more than a smart system that is enhanced with a Master or smart controller than can monitor and adjust radio and system behaviors based upon its understanding of the spectrum environment.

3. Dell’s Comments on Mesh Networks.

In sections 77 -80 “Mesh Networks” the NPRM defines mesh networks as ad hoc peer-to-peer networks as defined in previous documents (DA 02-1201.) While the conditions listed are interesting and in the future may provide some advantages for innovatively overcoming line of site and distance limitations, current non-peer-to-peer mesh systems should be considered for their benefits to technologies today. The FCC should grant the same benefits to non-peer-to-peer mesh networks that can take advantage of these self-healing and low latency bridging functions today. Flexible rules should not “lock in” any technologies or implementations that could limit innovations in mesh networking, whether future ad-hoc or more current complete mesh systems.

4. Equipment Authorization Rules and Part 15 Comments.

In sections 81 -94 on SDR and Cognitive Radio Equipment Authorization Rules, Dell believes that rule changes should follow current certification demands and circumstances. Dell would like to see flexibility in permissive change abilities as well as the choice of certification paths where appropriate. It is stated in the NPRM that the primary focus of this NPRM regarding SDR rules is for *“radios that are designed so the software can be easily changed after manufacture”*.

While Dell understands the broader market consideration of the FCC, we also stress the controls known to the FCC, that Dell exercises in the specific radios and the corresponding software that can be installed on a Dell system. We appreciate simplifications to the system such as allowing a flow diagram as a high level description of the radio software as an alternative to a copy of the radio software. However, we urge the FCC to keep in mind the tight security controls that Dell currently exercises over the platforms and radios that it markets and services. Dell would prefer that rules were designed to ensure that the spectrum rules are being met, instead of specifying an implementation or requiring a stringent approval or update process as a control mechanism. Section 87 indicates *“By not declaring a radio as an SDR, the manufacturer is not required to incorporate the necessary security features to ensure that only software that is part of an approved hardware/software combination can be loaded.”* In fact Dell currently incorporates security features in new certifications to make these assurances even in non-SDR submissions.

In section 94, the FCC seeks comment on the liability to the manufacturer should these security methods be broken. Misuse of a product and altering by a user of that product is beyond the control of the manufacturer. Dell controls these types of abuses with our system secured Dell WLAN software/firmware implementations and by the strict revocation of all warranties should un-approved and supported modifications be made. Dell believes that if the manufacturer meets or exceeds an industry standard for security methods the manufacturer should be free from any additional responsibility for these unique and unlikely modifications by an end user. In sections 95 – 98 on “Proposals for Part 15 rule changes”, Dell strongly urges that accommodations be made to allow for Automatic Frequency Selection (AFS) for unlicensed devices. The NPRM states:

“Unlicensed transmitters are now being manufactured in which the frequency range of operation can be software selectable. However, a transmitter can not be approved in the United States unless it is capable of complying with the technical requirements of the rule part under which it will be operated.¹²³ Therefore, an unlicensed transmitter that is capable of operation outside permitted bands of operation under Part 15 of the rules cannot be certified for operation in the United States.”

Dell does agree that an end user should not be able to software select a frequency of operation outside permitted bands of operation under Part 15 rules. However, Dell *does not* agree that a device that is capable of operation outside of permitted bands of operation under Part 15 rules cannot meet the technical requirements under Part 15 in the US.

In the case of a client device that can incorporate technology akin to the IEEE 802.11 addendum TGd, this type of technology will allow a client device to meet these requirements. As a

transition measure, passive scanning should be allowed to serve the same purpose for these client devices. If all certified APs are set to the legal frequencies in the US, a client device will connect to the AP that is controlled to operate in the frequency bands allowed in the US. With the implementation of an interoperable TGD solution, or passive scanning as a transitional mechanism, there should not be a reason why a client would operate illegally in the US.

Furthermore, Dell recommends that while it may be possible to certify a Wi-Fi device to operate in US on channels 12 and 13 with reduced power and additional filters, it is not in the best interest of the consumer or industry to allow these certifications. The logic is that inclusion of these channels in unique cases will cause obstacles in implementation and transition to certain proposals under *Automatic frequency selection for unlicensed devices*. In the case where the AP or some other device in the network is capable of supplying the frequency selection information to the network client as specified in IEEE 802.11 TGD, it will be imperative that the AP is not one of these uniquely certified devices to operate in channels 12 and 13, otherwise, it may draw a client device that does not have these uniquely certified abilities, out of compliance.

Alternatively, by limiting the channel set to the standard 1-11 channels, even in the transition period – a client device that can passive scan for available APs without the TGD mechanism, will be in full compliance by connecting to any legal AP. Therefore, an unlicensed transmitter that is capable of operation outside permitted bands of operation under Part 15 of the rules can be certified for operation in the United States.

DELL'S CONCLUSION

Dell looks forward to the swift implementation of these rules that will enable more intuitive spectrum use and sharing. Dell appreciates the complex ecosystems that are affected by these rules and commends the FCC for its efforts in initiating this proceeding. The innovative evolution of the FCC's rules and policies regarding unlicensed devices and unlicensed spectrum has been a key force in the success of unlicensed devices in the market place and in their rapid acceptance by consumers and commercial enterprises.

Respectfully submitted,

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